

455

THE POLAR BEAR IN THE  
WESTERN CANADIAN ARCTIC

Evidence By

Ian Stirling

Mackenzie Valley Pipeline Inquiry  
C.O.P.E. Delta Phase  
February 1976

MACKENZIE VALLEY PIPELINE INQUIRY  
EXHIBIT NO. 455- A 1 Feb 11/76  
Involvement  
C.O.P.E.



Research on the polar bears (*Ursus maritimus*) in the western Canadian Arctic (hereinafter referred to as the western Arctic) was initiated by the Canadian Wildlife Service in 1970 to resolve questions involved with management of that species. Although about 60 polar bears were being killed each year by Inuit, there were no data to determine if the population could withstand that level of utilization. Data were required on the distribution and productivity of denning areas in relation to the number of bears being harvested annually from the population. Polar bears had been tagged in Alaska for three years but none had been killed in Canada. Thus, data were required on the relative discreteness of the two populations and in particular, on whether polar bears produced in Canada were supporting the Alaskan sport hunting of the species. Finally, non-resident sport hunting of polar bears in the western Arctic began in the spring of 1970, making it essential to obtain population data in order to respond to queries about the survival of polar bears in Canada.

Since the initiation of this project, two additional but interrelated aspects have developed. In November 1973, Canada, Denmark, Norway, the United States, and the Soviet Union signed an international agreement on the conservation of polar bears (Appendix I) which stated in part: "Each contracting party shall take appropriate action to protect the ecosystems of which polar bears are a part..." and "They (contracting parties) shall...consult with other parties on the management of migrating polar bear population, and exchange information on research and management programmes...." The second major development is the potential for environmental damage created by offshore oil drilling. Current plans for offshore oil exploration in





eastern Beaufort Sea call for the initiation of drilling activity in the summer of 1976. If the exploratory phase is successful, much more drilling activity will ensue, followed naturally by production for several years thereafter.

Recovery of tagged bears has demonstrated movements between western Canada and Alaska and that the Inuit of both areas hunt this migratory population. Because of the international agreement, possible detrimental effects to polar bears resulting from offshore drilling must be minimized. For example, as will be detailed later, the area in which the first drilling will take place is one of the most important feeding areas for polar bears in the western Arctic.

Besides its obvious esthetic value, the polar bear represents a substantial component of the cultural and economic base of the Inuit of the western Arctic. At one time, polar bear meat was used for food for both people and dogs; and the hides were utilized to a lesser degree for trade or the making of clothing. In more recent times however, the principal motivation for polar bear hunting has been the sale of the hides, several of which sold for prices in excess of \$3000 in 1973. A limited amount of meat is still utilized for food, both by humans and dogs. As such, there is a direct economic value in the polar bear resource plus the sociological and cultural values of a self-supporting existence for the hunters and trappers involved.

Polar bears live primarily on ringed seals (*Phoca hispida*) and to a lesser degree on bearded seals (*Erignathus barbatus*). However, when a polar bear kills a seal, it often leaves a large portion of the



Digitized by the Internet Archive  
in 2025 with funding from  
University of Toronto

<https://archive.org/details/31761120644547>

meat and entrails, and sometimes fat as well, uneaten on the sea ice, although hungry bears or family groups may eat the whole seal, particularly if it is small. Thus, in the western Arctic, from freezeup in the fall to break-up in the early summer, there is an abundant, high-quality, alternate food source in the form of seal carrion. Consequently, large numbers of arctic foxes go out onto the ice to follow the polar bears and survive by scavenging throughout the winter. This relatively little known aspect of polar bear ecology is probably highly significant to the white fox trapping industry of the western Arctic so that anything that detrimentally affected the distribution and abundance of polar bears and seals could have a significant effect on the land based trapping economy as well.

It may be helpful here to summarize the life history of the polar bear.

The polar bear is circumpolar in distribution. In Canada, its range extends from the permanent pack ice of the Arctic Ocean and high arctic islands to southern James Bay.

Although any polar bear may dig a den and use it for a few days during a winter storm, only pregnant females regularly den for an extended period, usually from about November to late March or April.

The maternity dens are often dug in deep snowdrifts on steep slopes, riverbanks, or stream banks located near the sea. Some maternal denning takes place on the drifting pack ice of the Beaufort Sea but the extent to which this occurs is not known.





Polar bears, like several other mammal groups have delayed implantation. This means that the fertilized egg does not begin to grow immediately but remains in the uterus in a dormant state. Thus, although the polar bear mates in May, the fertilized egg does not implant and begin to grow until about September.

In captivity, the young, normally two, are born anywhere from late November to January. In the wild there is likely as much or more variation in birth dates because of latitudinal differences in the Arctic seasons. Baby polar bears are hairless, blind, and weigh only about 1½ pounds at birth. By the time they leave the den in March or April the cubs weigh approximately 20 pounds. The females lose weight while suckling the cubs and are hungry when they leave the den. Most young polar bears stay with their mothers until they are 2½ years old, although some may remain with the female into their third or fourth year.

Once back on the sea ice the diet of the polar bear consists mainly of ringed and bearded seals. However, observations have been made of bears catching sea birds by diving and coming up beneath them and of bears diving for and eating kelp. Seals are mainly captured by stalking, waiting for the animal to surface at a breathing hole or, in the spring, digging out seal pups and sometimes adults from the birth lairs beneath the snow. Few seals captured are wholly eaten by the bears that caught them.

When full grown, adult males in Canada range from about 1,000 to 1,200 lb. (450-550 kg) while adult females weigh from about 400 to 600 lb. (180-270 kg).



gree of discreteness between the polar bear population in the Barrow area and that off the west coast of Alaska.

The polar bears in the western Arctic have a fairly well defined pattern of seasonal movements. From freeze-up in the fall, to break-up in the late spring, polar bears are distributed throughout the southeastern Beaufort Sea and Amundsen Gulf.

As break-up proceeds through the late spring and early summer, the annual ice disappears from the mainland coast and Amundsen Gulf, and the southern edge of the permanent pack ice retreats to the north. Most bears apparently migrate north to stay with the ice although they may move back and forth within a local area for as long as the ice remains intact. Presumably they do this so as to be able to continue to hunt seals since they are unable to capture seals in the open water and the seals very rarely haul out on land. Occasionally some bears spend the summer on land on the south end of Banks Island probably by accident rather than by design.

In years such as 1974, when break-up was much more limited and a large proportion of the ice did not move north, sightings of bears off the mainland coast and Baillie Islands were common during the summer, suggesting that the northward migration in summer is more facultative than obligatory.

During October or November, depending on when freeze-up takes place, the bears immediately migrate south. This movement was first documented by Stefansson but movements of large numbers of bears south along the west coast of Banks Island have been well known to the Inuit of that





region for many years. Presumably the stimulus for this movement is to reach areas where there are either more seals or better hunting conditions, or both.

Lentfer reported that in Alaska, polar bears are much more abundant during years in which a large amount of the permanent pack ice is blown south to the mainland coast than when it is sparse. Similarly, at Herschel Island, in 1970 and 1975, when heavy pack ice moved south in early October and remained there, numerous polar bear sightings were reported.

Alternately, however, should the ice suddenly be blown offshore from the mainland by SE winds after freeze-up, the bears move back out with it rather than remain on the coast.

Polar bears are not distributed evenly over the ice-covered surface of the sea, but are clumped on specific ice types, presumably in relation to the abundance and availability of seals. For the purpose of this discussion, the sea ice, between the late fall and late spring, may be divided into a series of broad habitat types in terms of its usage by polar bears as follows:

- 1) stable flat ice areas interspersed with pressure ridges that have not moved for a long time; drifted and suitable for seal lairs;
- 2) as above but without suitable drifts for seal lair construction;
- 3) the floe edge where leads are wide (1 km), usually with small open or refrozen leads parallel to floe edge or emanating from it, some pressure ridges, occasionally fresh but usually not heavily drifted;



- 4) areas of 9/10 or 10/10 ice cover but in "active zones", such as around Baillie Island, where wind and sea currents cause much movement of ice, followed by refreezing, creating intermittent lanes or patches of refrozen young ice, bare or only slightly drifted;
- 5) areas of continuous heavy pressure ice that have not moved for a long time, relatively uncommon though present in extensive areas in 1974;

Type 4, the active ice habitat, was the most important and 47% (181/385) of our sightings were made there. Type 3 the floe edge was the next most important area with 40% of the sightings. The number of sightings recorded from habitat types 1, 2, and 5 may be biased to the low side because almost all bears have to be located by tracking and conditions are often very difficult. Nevertheless, of the latter three habitat types, only type 1, with birth lair habitat for ringed seals, attracts a significant proportion of the polar bears.

Ringed and bearded seals are concentrated along the last open leads prior to freeze-up. At freeze-up, they maintain their own breathing holes in refrozen leads on pressure ridges by abrading the ice with the heavy claws of their foreflippers. Drifting snow covers the breathing holes, providing a degree of protection from predators. In stable ice areas (type 1 habitat) where the drifts become deep enough, the pregnant female ringed seals scoop out subnivean birth lairs in which to give birth to their single pups. Ringed and bearded seals also concentrate in areas where the combination of currents and winds periodically form open patches of water, because of easy access





to the air, and subsequently along those when they re-freeze (Type 4 habitat). It appears from aerial survey data that the distribution of bearded and ringed seals is more influenced by the distribution of leads than by water depth.

Recent studies of the behavior of wild polar bears have shown that the most common method of hunting seals is to wait beside an open, or snow-covered, breathing hole and wait for the seal to surface to breathe. This is especially true during cold or windy weather when few seals haul out on the ice. Thus, it is obvious that seals are much more accessible to bears through their relatively exposed breathing holes on refrozen leads than they are under heavy snow drifts under pressure ridges. Similarly, we suspect that the most beneficial aspect of the floe edge to a polar bear is hunting along the narrow band of small open and refrozen leads that emanate from the ice edge itself.

The importance of the habitat Types 3 and 4 is clear from the above discussion. The value of those habitat types is greatly magnified by the fact that they are relatively limited in distribution and that they overlies a large proportion of the offshore acreage currently under lease for present or future offshore exploration and potential production. Furthermore, it is clear that industrial activity anywhere in the Type 3 or 4 habitat areas has a potential influence on a large proportion of the entire population of polar bears in the eastern Beaufort Sea and Amundsen Gulf, not simply those present in the immediate vicinity at the time. In addition, it is clear that industrial activity offshore from the mainland coast could influence part of the polar bear population shared between



Alaska and Canada.

In 1972 and 1973 conditions were good for seals everywhere in the study area so that the polar bear population was widely dispersed.

1974 was one of the heaviest ice year on record. During the winter of 1973-74, the winds consistently came from the northwest, resulting in heavy compaction of the ice throughout the study area. Through that winter, there were few or no periods during which there were areas of open and freshly refrozen leads. As a result, a large proportion of the seals present probably had breathing holes that were not nearly as accessible to polar bears as they are on refrozen leads. In addition, there was a relatively low snow-fall so that the extensive snow drifts in which seals make their lairs did not form. The result of this lowered accessibility of seals throughout the whole study area meant that bears had to travel extensively in search of seals because there were few areas in which the bears could concentrate their efforts. Whenever such local areas existed, such as in the vicinity of the Baillie Islands, there were great concentrations of bears. However, to generalize, the pattern was one of more extensive travelling in search of local areas of greater seal abundance and accessibility.

In 1975, there was an interesting variation on the ice conditions that prevailed in 1974. The ice in Amundsen Gulf was again relatively unproductive for seals but the offshore leads along the mainland and Banks Island coast opened and refroze periodically, providing good hunting conditions. The numbers of seals appeared to be low everywhere which made the





areas in which they were concentrated and accessible to polar bears even more important. It is clear that a marked reduction in both numbers and productivity of ringed seals has taken place in the Eastern Beaufort Sea and Amundsen Gulf. We have no baseline data from earlier years but the numbers of ringed and bearded seals that were counted in 1975 were about half the numbers counted the year before. However, no one yet knows how to reliably relate the numbers of seals on the ice with the total number present.

It is not clear which factors caused these changes but some points should be considered. In 1974 and 1975, there was much less snow cover than in 1972 or 1973 in which the seals could construct their subnivean birth lairs during the late winter and early spring. Also, in 1974, the winter winds blew predominantly from the NW instead of alternating between the SE and the NW. Consequently, instead of the usual series of leads which open and refreeze parallel to the mainland coast and the west coast of Banks Island, the ice was heavily compacted and frozen solid against the land and for many miles offshore. Thus, it was probably much more difficult for the large numbers of subadult seals that normally concentrate along those lead systems to maintain their breathing holes through the winter. We do not know for certain if seals can still maintain their breathing holes adequately under these conditions, if a large proportion cannot and thus die, or if there are large scale movements of a substantial proportion of the population. However, the Inuit have for years recorded movements of large numbers of subadult seals from east to west along the coast during the fall. Many of these seals probably return from



west to east in the spring by moving along the open leads offshore parallel to the coast. If this is so, it makes that lead system a very important migration route. Nor do we know if such ice conditions have any adverse effect on the prey species of the seals. We do know that the numbers of seals present in the Eastern Beaufort Sea and Amundsen Gulf dropped markedly. Smith and Geraci also demonstrated that the ringed seals were in a much poorer nutritional condition in 1974. Because of the extent of the change in numbers, it is particularly unfortunate that we do not have comparable survey data from this area for 1972 or 1973 when conditions appeared to be more suitable.

It is clear that in years such as 1975, when polar bears are more dependent on a limited area for feeding, they are even more vulnerable to detrimental influences on their habitat or the prey species they depend on for existence. No one knows what the actual effect of oil on polar bears would be. Polar bears swim often and hunt seals at breathing holes by putting their head in the water while trying to bite them. It is unknown what the effect would be of oil on a bear's eyes, or of thermoregulatory abilities of the coat if fouled by oil. It is not known whether or not bears would avoid oiled areas.

Most maternity denning in the western Arctic occurs along the coastal areas of Banks Island and western Victoria Island. Apparently, maternity denning of polar bears along the mainland coast occurs infrequently since only three dens have been reported by Inuit hunters in the last 10 years and only one was found during this study. Some dens have been located along the Alaskan coast but the total is insignificant when compared to





the large size of the population of polar bears on the sea ice north of Alaska. Although maternity denning has been confirmed in the multi-year pack ice of the Beaufort Sea, as yet there is no further information on the extent to which this occurs.

Estimations of population size are difficult to make, mainly because of the problems of sampling representatively and small sample sizes. The problems in the Western Arctic are aggravated by the fact that the population appears to have declined sharply in the last two years. However, even with the data available, it is clear that the population of bears probably does not exceed 1500 and at present, it could be as low as 1000.

I would like to make a few brief comments on the concept of critical areas. In the simplest of terms, the survival of any species is dependent upon its ability to feed and reproduce successfully. Thus, the most important aspect of the conservation and management of a species is the protection of the most important areas of feeding and breeding habitat. If that condition is met, a population can recover, in time, from a large scale reduction in numbers, be it caused by accident or by design. Attempts to preserve, in this instance the maximum number of individual polar bears, would be of little value if the key feeding and denning areas were destroyed. Therefore, I have restricted my comments to these two key aspects.



The most important area for polar bears and seals in the western Arctic is the shear zone, or area of moving leads that parallels the mainland coast and the west coast of Banks Island. Because seals are more concentrated there or simply more accessible to the bears, or both, that area is critical to the maintenance of a viable polar bear population in the western Arctic, especially in years such as 1974 and 1975 when seal numbers and productivity in the fast ice areas was low. During the open water period, the polar bears are absent in the more <sup>southerly</sup> northerly areas so that industrial activities which took place then would have no effect on the bears provided there were no detrimental effects on the seal stocks.

Unpublished behavioural data suggest that polar bear hunting efficiency is lower in the summer when the ice is perforated with melt pools, leads, and large areas of open water because the seals have an almost unlimited number of alternate holes in the ice in which to breathe, and in many of these they are simply not vulnerable to predation. Thus, less caloric benefit is gained per unit of energy expended during hunting activities between break-up and freeze-up and hunting success is more variable. The speed with which the southern migration of the polar bears in the western Arctic occurs after freeze-up illustrates their dependence on the winter and spring feeding areas.

Denning areas are only used by pregnant female polar bears between about late October and mid-April. Most dens are located within five to ten miles of the coastline. Because of the altricial nature of polar bear cubs at birth





it seems likely that disruption of dens, prior to the time they would normally be deserted, would result in a high degree of mortality of newborn cubs.



With respect to recommendations related to industrial activity, I would make two comments.

a) With respect to the key feeding areas, the obvious recommendation would be, ideally no industrial activity between about mid-October and mid-May or at best to keep it at a minimal level at highly specific sites. Areas in which Inuit hunting occurs should be avoided during the period which the sea is frozen. It is not yet clear what the reaction of both the polar bears and the seals would be to extensive industrial activity and aircraft noise but until we know more about this aspect, a circumspect approach seems advisable.

b) With respect to denning areas, surface activities such as seismic operations should not be permitted, certainly within five miles (8 km) and preferably not within 10 miles (16 km) of the coastline of Banks Island, between 1 October and 30 April.

In term of research recommendations, I think that some monitoring of both polar bear and seal populations is essential, especially during the initial stages of exploration.

An in-depth study should be conducted on the effect of man, machines, and industrial activity on polar bear behaviour and distribution. Nothing is known on this





subject. This research should encompass a variety of areas including the Western Arctic, High Arctic and Western Hudson Bay. The purpose would be to obtain quantitative measures of the importance of disturbance, the degree to which acclimation occurs, and forms of deterrents that might be valuable. Equally important would be a discussion of what attracts bears in the first place. The benefits would apply to human activities throughout the arctic but could be especially valuable to offshore activities in ice-covered waters. The problems of man-bear conflicts and how to minimize them would be included here. No single method on activity is known to be completely successful in deterring bears. However, some things are helpful such as keeping camps clean of attractant odors such as garbage, having dogs outside for warning, and the use of explosive scaring devices. Electric fences have been used fairly successfully on grizzly bears to keep them out of garbage dumps in Yellowstone Park.



A mammal which is of great economic importance to the Inuit of the Western Arctic, but has received little consideration to date in relation to the sea ice habitat, is the arctic fox (*Alopex lagopus*). Dr. Smith and I summarized some of the interspecific relationships of mammals in the pack ice ecosystem. We specifically noted the value of carrion left from seals killed by polar bears to the maintenance of large numbers of arctic foxes in the western Arctic. It would be of great value to undertake an in-depth baseline study of the population dynamics of the arctic fox and assess the relative importance of its different food sources in different seasons and years. The benefit of such a study would be to determine the importance of the sea ice habitat to the arctic fox population, and consequently to the fur-based economy of the region. This would provide further understanding of possible detrimental affects, natural or otherwise, on the wildlife component of the total economic base of the Inuit of the area.

To date, there is only a limited amount of baseline data on heavy metal and PCB contamination <sup>at</sup> from polar bears and seals in the western Arctic. Because these mammals are at the top of the food chain, they can serve as indicators of the degree of contamination present in the ecosystem. Therefore, it would be valuable to collect more specimens to establish a firm baseline on the present contamination level





against which change, if it occurred could be measured.

It is also important in a human context because the Government of the N.W.T. is encouraging a program of having people move back to the land, and while there, utilize natural foods such as caribou and seal. In the case of seals, dangerously high levels of mercury contamination have already been recorded in some locations.

The witness will show some slides.



Page in

APPENDIX I →

## AGREEMENT

ON

## THE CONSERVATION OF POLAR BEARS





THE GOVERNMENTS of Canada, Denmark, Norway, the Union of Soviet Socialist Republics, and the United States of America,

RECOGNIZING the special responsibilities and special interests of the States of the Arctic Region in relation to the protection of the fauna and flora of the Arctic Region;

RECOGNIZING that the polar bear is a significant resource of the Arctic Region which requires additional protection;

HAVING DECIDED that such protection should be achieved through co-ordinated national measures taken by the States of the Arctic Region;

DESIRING to take immediate action to bring further conservation and management measures into effect;

HAVE AGREED AS FOLLOWS:



## ARTICLE I

1. The taking of polar bears shall be prohibited except as provided in Article III.
2. For the purpose of this Agreement, the term "taking" includes hunting, killing and capturing.

## ARTICLE II

Each Contracting Party shall take appropriate action to protect the ecosystems of which polar bears are a part, with special attention to habitat components such as denning and feeding sites and migration patterns, and shall manage polar bear populations in accordance with sound conservation practices based on the best available scientific data.





ARTICLE III

1. Subject to the provisions of Articles II and IV, any Contracting Party may allow the taking of polar bears when such taking is carried out:
  - (a) for bona fide scientific purposes; or
  - (b) by that Party for conservation purposes; or
  - (c) to prevent serious disturbance of the management of other living resources, subject to forfeiture to that Party of the skins and other items of value resulting from such taking; or
  - (d) by local people using traditional methods in the exercise of their traditional rights and in accordance with the laws of that Party; or
  - (e) wherever polar bears have or might have been subject to taking by traditional means by its nationals.



2. The skins and other items of value resulting from taking under sub-paragraphs (b) and (c) of paragraph 1 of this Article shall not be available for commercial purposes.

#### ARTICLE IV

The use of aircraft and large motorized vessels for the purpose of taking polar bears shall be prohibited, except where the application of such prohibition would be inconsistent with domestic laws.

#### ARTICLE V

A Contracting Party shall prohibit the exportation from, the importation and delivery into, and traffic within, its territory of polar bears or any part or product thereof taken in violation of this Agreement.

#### ARTICLE VI

1. Each Contracting Party shall enact and enforce such legislation and other measures as





may be necessary for the purpose of giving effect to this Agreement.

2. Nothing in this Agreement shall prevent a Contracting Party from maintaining or amending existing legislation or other measures or establishing new measures on the taking of polar bears so as to provide more stringent controls than those required under the provisions of this Agreement.

#### ARTICLE VII

The Contracting Parties shall conduct national research programmes on polar bears, particularly research relating to the conservation and management of the species. They shall as appropriate coordinate such research with research carried out by others Parties, consult with other Parties on the management of migrating polar bear populations, and exchange information on research and management programmes, research results and data on bears taken.



### ARTICLE VIII

Each Contracting Party shall take actions as appropriate to promote compliance with the provisions of this Agreement by nationals of States not party to this Agreement.

### ARTICLE IX

The Contracting Parties shall continue to consult with one another with the object of giving further protection to polar bears.

### ARTICLE X

1. This Agreement shall be open for signature at Oslo by the Governments of Canada, Denmark, Norway, the Union of Soviet Socialist Republics and the United States of America until 31st March 1974.
2. This Agreement shall be subject to ratification or approval by the signatory Governments. Instruments of ratification or approval shall be deposited with the Government of Norway as soon as possible.





3. This Agreement shall be open for accession by the Governments referred to in paragraph 1 of this Article. Instruments of accession shall be deposited with the Depositary Government.
4. This Agreement shall enter into force ninety days after the deposit of the third instrument of ratification, approval or accession. Thereafter, it shall enter into force for a signatory or acceding Government on the date of deposit of its instrument of ratification, approval or accession.
5. This Agreement shall remain in force initially for a period of five years from its date of entry into force, and unless any Contracting Party during that period requests the termination of the Agreement at the end of that period, it shall continue in force thereafter.



6. On the request addressed to the Depositary Government by any of the Governments referred to in paragraph 1 of this Article, consultations shall be conducted with a view to convening a meeting of representatives of the five Governments to consider the revision or amendment of this Agreement.
7. Any Party may denounce this Agreement by written notification to the Depositary Government at any time after five years from the date of entry into force of this Agreement. The denunciation shall take effect twelve months after the Depositary Government has received the notification.
8. The Depositary Government shall notify the Governments referred to in paragraph 1 of this Article of the deposit of instruments of ratification, approval or accession, of the entry into force of this Agreement and of the receipt of notifications of denunciation and any other communications from a Contracting Party



specially provided for in this Agreement.

9. The original of this Agreement shall be deposited with the Government of Norway which shall deliver certified copies thereof to each of the Governments referred to in paragraph 1 of this Article.
10. The Depositary Government shall transmit certified copies of this Agreement to the Secretary-General of the United Nations for registration and publication in accordance with Article 102 of the Charter of the United Nations.





## APPENDIX II

### Reports referred to or relied on

Bowes, G.W. and C.J. Jonkel. 1975. Presence and distribution of polychlorinated Biphenyls (PCB) in Arctic and subarctic marine food chains. J. Fish. Res. Board Can., 32:

Chapman, D.G. and D.S. Robson. 1960. The analysis of a catch curve. Biometrics, 16: 354-369

Cross, D.W. 1975. Polar bear denning survey. Survey Completion Report, Dept. Mines, Resources, and Environmental Management. The Pas, Man. 3 pp., 5 Append.

Frame, G.W. 1972. Occurrence of polar bears in the Chukchi and Beaufort Seas during summer, 1969. J. Mamm. 52(24): 187-189.

Harrington, C.R. 1964. Polar bear study - Banks Island, Northwest Territories, 1963, Can. Wildl. Serv. Rept. 33 p.

\_\_\_\_\_. 1968. Denning habits of the polar bear (*Ursus maritimus* Phipps). Canadian Wildlife Service Rept. Ser. 5, 30 p.

Larsen, T. 1971. Capturing, handling, and marking polar bears in Svalbard. J. Wildl. Mgmt., 35: 27-36

Leffingwell, E. deK. 1919. The Canning River Region, Northern Alaska. U.S. Geological Survey Professional Paper 109. U.S. Government Printing Office, Washington, D.C. 247 pp.

Lentfer, J.W. 1968. A technique for immobilizing and marking polar bears. J. Wildl. Mgmt., 32: 317-321.

✓ \_\_\_\_\_ . 1972. Polar bear - sea ice relationships. pp. 165-171. In S. Herrero [Ed.]. Bears - their Biology and Management. IUCN New Series, 23. Morges, Switzerland.

\_\_\_\_\_ . 1973. Polar bear report. Alaska Department of Fish and Game, Juneau, Alaska. Project Progress Report. Vol. 14. 24 pp.



## CURRICULUM VITAE

Dr. Ian Stirling

Name: Ian Grote Stirling

Age and Date of Birth: 34, 26 September, 1941

Citizenship: Canadian

Marital Status: Married, two daughters, one son

Education: Grades 1-12 British Columbia Public School System  
Kimberley, B.C.

B.Sc. (1963) University of British Columbia

M.Sc. (Completed November, 1965, awarded in 1966),  
U.B.C.

Ph.D. (Completed August, 1968, awarded in 1969),  
Canterbury University, Christchurch, New  
Zealand

Scholarships: 1965 Canadian Wildlife Service Graduate  
Research Scholarship

1966-68 University Grants Committee Post-Graduate  
Research Scholarship (Wellington, New Zealand)

### Teaching Experience:

1963-64 Lab Instructor in Introductory Zoology, U.B.C.

1964-65 Lab Instructor in Vertebrate Physiology and part-time  
in Biology of the Vertebrates, U.B.C.

1966-68 Lab Instructor in Vertebrate Zoology for B.Sc. students  
in their final year at Canterbury University,  
Christchurch, New Zealand.

1968-69 (6 months) Temporary Assistant Lecturer in Zoology  
Department, Canterbury University, Christchurch,  
teaching vertebrate ecology labs, giving occasional  
lectures, and overhauling curation of museum and  
teaching vertebrate specimen collections.

1966 &

1967 (during winter) Night school course for Department of  
Extension Studies on adaptations of animals to their  
respective environments.

1970-75 Lectures on marine mammals to U. of A. Arctic Summer  
School, Dalhousie U. graduate course in marine  
mammalogy, and miscellaneous seminars to wildlife or  
vertebrate zoology courses, at various universities  
each winter.







## Field and Research Experience:

- 1962            Field Assistant (Ornithology), National Museum of Canada field party to northern B.C. and southern Yukon (3 months).
- 1964            Museum Advisor in Mammalogy, National Museum field party to northern Yukon (3 months).
- 1963-65        Part-time weekend work for B.C. Fish and Game Branch and Canadian Wildlife Service on hunter road checks (deer and waterfowl) and evaluation of hunter use of marshland in Boundary Bay near Vancouver.
- 1963-65        Research at U.B.C. on the holding, behavior and nutrition of captive blue grouse and some comparative work on Vancouver Island. (M.Sc. work).
- 1965-68        Research on population ecology of the Weddell seal in McMurdo Sound and the Western Ross Sea, Antarctica, (Ph.D. work).

After completion of my thesis, I took a technician to McMurdo Sound to assist me with some extra work I wished to complete and teach him to run the project on a long term basis and outlined several more thesis topics.

Two students are now underway in post-graduate research in this programme.

- 1966-69        Part-time work around the South Island of New Zealand on the behavior and ecology of the New Zealand fur seal, also through Canterbury University.

This species was little known and one major problem was simply finding a colony that it was practical to work on. A marked population was established at a breeding colony and a research outline was drawn up to guide further work.

Two students have completed M.Sc. projects from this study and two more are underway.

- 1969-70        (18 months) Research on social behavior of Australian fur seals and sea lions at the Mawson Institute for Antarctic Research, University of Adelaide, South Australia.

This was a particularly productive project in which I studied behavior in relation to taxonomy (which in southern otariids has been particularly confused).



Field and Research Experience: (Continued)

A preliminary management plan with notes on needed research was drawn up and left with the South Australian Fisheries Department. Two honours have now completed projects arising from this research and a Ph.D. study has started as well.

1970 to present      Research on polar bear ecology and population parameters and the relationship between polar bear distribution and abundance, seal distribution and abundance, and pack ice conditions. In 1974, this expanded to include a biologist and four technicians working under my direct supervision, and in 1975, six technicians. Field work is done throughout the Canadian Arctic on a variety of projects designed to ask specific scientific questions, provide specific management recommendations, and provide guidelines to minimize detrimental environmental effects from industrial exploration and production activities as well as minimize man/bear conflicts.

1974              During the fall I returned to Antarctica as a visiting scientist to participate in the ongoing seal population research of the University of Minnesota, which has followed on my work in the late 1960's.

Related Duties:

- 1) Federal-Provincial Technical Committee for polar bear research and management in Canada

1970-71 - member

1971-present - chairman - duties involve organizing our annual meeting of biologists from the 7 jurisdictions in Canada that have polar bears, to review the research of the previous year and up-date the management of the species.

- 2) American Society of Mammalogists, Marine Mammal Committee

1971-73 - member

1973-present - chairman - duties involve responding to requests for information on marine mammals from members and non-members of the ASM, and writing an annual report summarizing major activities in research, information sources, conservation issues, and management. This report is circulated to members and to a world-wide variety of bodies concerned with marine mammals.





3) Northwest Territories Marine Mammal working group

- member since formation in 1974; duties - to help review marine mammal research and management requirements for the N.W.T.

4) IUCN Polar Bear Specialists Group

- member since 1974; duties are to help co-ordinate international co-operation in research and exchange of scientific information.

Theses

- 1965        Studies of the holding, behavior, and nutrition of captive blue grouse. M.Sc. Thesis, University of British Columbia, 125 pp.
- 1968        Population ecology of the Weddell seal (Leptonychotes weddelli) in McMurdo Sound, Antarctica. Ph.D. Thesis, University of Canterbury, Christchurch, 181 pp.

Papers

- 1966        Census of blue grouse with recorded calls of a female. J. Wildl. Mgmt., 30:184-187. (Stirling, I. and J.F. Bendell).
- The seals of White Island, a hypothesis on their origin. Antarctic, 4:310-313.
- 1967        Population studies on the Weddell seal. Tuatara (N.Z.), 15:133-141.
- 1968        Aggressive behavior and dispersion of female blue grouse, Can. J. Zool., 46:405-408.
- Diurnal movements of the New Zealand fur seal at Kaikoura. N.Z. J. Mar. and Freshwat. Res., 2:375-377.
- 1969        Toothwear as a mortality factor in the Weddell seal, Leptonychotes weddelli. J. Mamm., 50:559-565.
- Ecology of the Weddell seal in McMurdo Sound, Antarctica. Ecology, 50:575-586.
- Distribution and abundance of the Weddell seal in the Western Ross Sea, Antarctica. N.Z. J. Mar. and Freshwat. Res., 3:191-200.
- 1970        Observations on the behavior of the New Zealand fur seal (Arctocephalus forsteri). J. Mamm., 51:766-778.
- The reproductive behavior of blue grouse. Syesis, 3:161-171. (Stirling, I. and J.F. Bendell).





Papers continued

- 1971      Leptonychotes weddelli. Mammalian Species (published by the American Society of Mammalogists), No. 6. 5pp.
- The crabeater seal (Lobodon carcinophagus) in McMurdo Sound, Antarctica, and the origin of mummified seals. J. Mamm. 52:175-180. (Stirling, I. and G.L. Kooyman).
- Population aspects of Weddell seal harvesting in McMurdo Sound, Antarctica. Polar Rec., 15:653-667.
- Studies on the behavior of the South Australian fur seal, Arctocephalus forsteri (Lesson): I. Annual cycle, postures and calls, and the adult males during the breeding season. Aust. J. Zool., 19:243-266.
- 1971      Studies on the behavior of the South Australian fur seal, Arctocephalus forsteri (Lesson). II. Adult females and pups. Aust. J. Zool., 19:267-273.
- Implications of a comparison of the airborne vocalizations and some aspects of the behavior of the two Australian fur seal species (Arctocephalus sp.) on the evolution and present taxonomy of the genus. Aust. J. Zool., 19:227-242. (Stirling, I. and R.M. Warneke).
- Population dynamics of the Weddell seal in McMurdo Sound, Antarctica, 1966-68. Antarctica Research Series (Published by the American Geophysical union, Washington) Vol. 18, Antarctic Pinnipedia p. 141-163. (Ed. W.H. Burt).
- 1972      Regulation of numbers of an apparently isolated population of Weddell seals. J. Mamm., 53:107-115.
- The economic value and management of seals in South Australia. South Australian Department of Fisheries and Fauna Conservation Technical Bulletin No. 2. 11p.
- Observations on a stabilizing population of Weddell seals. Aust. J. Zool., 20:23-25.
- Observations on the behavior of the Australian sea lion (Neophoca cinerea, Peron). Aust. J. Zool., 20:271-279.



Papers continued

- 1973           Vocalization in the ringed seal (Phoca hispida).  
J. Fish. Res. Bd. Canada, 30:1592-1594.
- 1974           Movements of Weddell seals in McMurdo Sound,  
Antarctica. Aust. J. Zool., 20:23-25.
- Polar bear research in the Beaufort Sea. pp. 721-  
733 In: (J. Reed and J.E. Sate, Eds.) Proceedings  
of the Symposium on Beaufort Seas Coastal and Shelf  
Research. San Francisco, 7-9 January, 1974. Arctic  
Institute of North America. Arlington, Va.
- Midsummer observations on the behaviour of wild  
polar bears (Ursus maritimus). Can. J. Zool.,  
52:1191-1198.
- Polar bear management. pp. 55-62 in: The Symposium  
on Endangered and Threatened Species of North America.  
June 11-14, 1974. Washington, D.C. (C. Jonkel and  
Ian Stirling).
- 1975           Adaptations of Weddell and ringed seals to exploit  
polar fast ice habitat in the presence or absence  
of land predators. In: Llano, G.A., (Ed.)  
Adaptations Within Antarctic Ecosystems. Proc.  
Third Symposium on Antarctic Biology. Washington,  
D.C. 26-30. August, 1974 (in press).
- Factors affecting the evolution of social behaviour  
in the Pinnipedia. pp. 208-212, In: Proceedings of  
the First Symposium on the Biology of the Seal.  
August, 1972. Guelph, Ont. (Eds. W.K. Ronald and  
A.W. Mansfield). Reun. Cons. Int. Explor. Mer.  
(Denmark).
- The caloric value of whole ringed seals (Phoca  
hispida) in relation to polar bear (Ursus maritimus)  
ecology and hunting behaviour: Can. J. Zool.,  
53:1021-1026. (I. Stirling and E.H. McEwan).
- The breeding habitat of the ringed seal (Phoca  
hispida): The birth lair and associated structures.  
Can. J. Zool., 53:1297-1305. (T.G. Smith and I.  
Stirling).
- Notes on the present status of the polar bear (Ursus  
maritimus) in Ungava Bay and northern Labrador. CWS  
Progress Note 53. 8 pp. (Smith, Pauline, Ian  
Stirling, C. Jonkel, and I. Juniper).





Notes continued

- 1970      The avifauna of South Neptune Islands, South Australia. Emu, 70:189-192. (Stirling, I., S.M. Stirling, and G. Shaughnessy).
- The emperor penguin colony at Cape Washington in the Western Ross Sea, Antarctica. Notornis (N.Z.), 17:277-279. (Stirling, I. and D.J. Greenwood).
- 1971      Variation in the sex-ratio of newborn Weddell seals (Leptonychotes weddelli) during the pupping season. J. Mamm., 52:842-844.
- 1972      An elimination posture in the Pinnipedia. J. Mamm., 53:191-192 (Stirling, I. and R.L. Gentry).
- 1974      An overwintering walrus in the Beaufort Sea. Murrelet, 55:40-41.
- 1975      Population studies of Weddell seals in Eastern McMurdo Sound. (Siniff, D.B., I. Stirling, R. Hofman, D. DeMaster and P. Kirby).
- 1976      A cutaneous fibroma in polar bears. J. Wildl. Disease, (in press). Broughton, E., C. Jonkel and I. Stirling).

Management and Public Information

- 1972      Polar bear Research in Canada. IUCN Publications New Series, 35:50-53. (Jonkel, C., and I. Stirling).
- The Great White Bears. Nature Canada, 1:15-18. (Stirling, I. and C. Jonkel).
- Polar Bear: symbol of the wild. Outdoor Life, 150:82-85, 114, 116, 118, 120. (Stirling, I. and C. Jonkel).
- Polar bear management changes in Canada. IUCN Publication New Series, 35:54-59. (Stirling, I. and A.H. Macpherson).
- 1973      Polar bear studies. Vancouver Public Aquarium Newsletter, 27(3):1-3.



Management and Public Information continued

- 1975      Polar bear management changes in Canada. Proc. Fourth Working Meeting of the IUCN Polar Bear Specialist Group. 3-6 December, Morges, Switzerland, IUCN New Series (in press). (I. Stirling and Pauline Smith).
- Polar bear research in Canada, 1972-1974. Proc. Fourth Working Meeting of the IUCN Polar Bear Specialist Group. 3-6 December, Morges, Switzerland, IUCN New Series (in press). (C. Jonkel, I. Stirling, G. Kolenosky, S. Miller and R. Robertson).
- Current problems of research and management of the polar bear in the Northwest Territories. Final report of the Northwest Territories Intergovernmental Marine Mammal Working Group. (I. Stirling and C. Jonkel). (The whole published text of all contributions will simply be attributed to the Group rather than to individual authors).

Professional Memberships

1.            Canadian Society of Zoologists
2.            Canadian Society of Environmental Biologists
3.            American Society of Mammalogists
4.            Australian Mammal Society
5.            Canadian Wildlife Federation



